

**CHEMISTRY, PAPER-II**



**FEDERAL PUBLIC SERVICE COMMISSION  
COMPETITIVE EXAMINATION FOR  
RECRUITMENT TO POSTS IN BPS-17 UNDER  
THE FEDERAL GOVERNMENT, 2009**

**CHEMISTRY, PAPER-II**

S.No.	
R.No.	

TIME ALLOWED:	(PART-I) 30 MINUTES	MAXIMUM MARKS:20
	(PART-II) 2 HOURS & 30 MINUTES	MAXIMUM MARKS:80

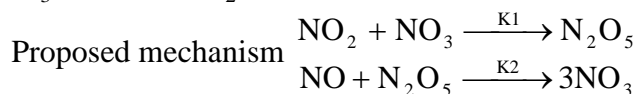
**NOTE:** (i) First attempt **PART-I (MCQ)** on separate **Answer Sheet** which shall be taken back after **30 minutes**.  
 (ii) **Overwriting/cutting of the options/answers will not be given credit.**  
 (iii) **Scientific Calculator is allowed.**

**PART – I (MCQ)**  
**(COMPULSORY)**

**Q.1. Select the best option/answer and fill in the appropriate box on the Answer Sheet. (20)**

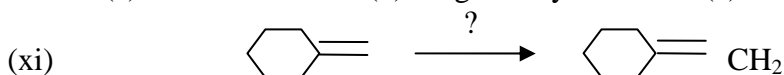
- (i) The orbitals providing the most efficient overlap are:  
 (a) s-s (b) p-p (c) sp-sp (d) sp<sup>2</sup>-sp<sup>2</sup>
- (ii) Nylon is a copolymer of:  
 (a) Urea and Formaldehyde (b) Phenol and Formaldehyde  
 (c) Hexamethylenediamine and adipic acid (d) Vinyl Chloride and Vinylalcohol
- (iii) Which of the following would react with one mole of Grignard's reagent to yield a ketone?  
 (a) RCONR' R" (b) RCONHR' (c) RCONH<sub>2</sub> (d) RCOOH
- (iv) Glyceraldehyde has one of the following properties:  
 (a) One asymmetric carbon atom (b) Two asymmetric carbon atoms  
 (c) A meso compound (d) Four asymmetric carbon atoms
- (v) The antifreeze compound ethylene glycol has the formula:  
 (a) C<sub>2</sub>H<sub>5</sub>OH (b) CH<sub>3</sub>OH (c) C<sub>2</sub>H<sub>4</sub>(OH)<sub>2</sub> (d) C<sub>3</sub>H<sub>5</sub>(OH)<sub>3</sub>
- (vi) Distillation is the best method for separating the two substances in which of the following:  
 (a) Water and salt dissolved  
 (b) water and a substance which does not dissolve in it  
 (c) Two liquids that have different boiling points  
 (d) Two solids that have different melting points.
- (vii) Which of the following describes "Amino" group as a substituent in electrophilic aromatic substitution.  
 (a) Weakly activating and O/P – directing (b) Strongly activating and O/P – directing  
 (c) Weakly deactivating, meta-directing (d) Strongly activating, meta-directing
- (viii) Which would be the best solvent to conduct this reaction.  

$$\text{CH}_3\text{CH}_2\text{Br} + \text{Mg} \longrightarrow \text{BrMgCH}_2\text{CH}_3$$
 (a) Acetone (b) Acetonitrile (c) Diethylether (d) Ethylacetate
- (ix) If K<sub>1</sub><K<sub>2</sub> which of the following rate laws is consistent with the mechanism proposed for the conversion of NO<sub>3</sub>+NO → 2NO<sub>2</sub>?



- (a)  $\frac{d[\text{NO}_3]}{dt} = K_1 K_2 [\text{NO}_2][\text{NO}_3]$  (b)  $\frac{d[\text{NO}_3]}{dt} = -K_1 K_2 [\text{NO}_2][\text{NO}_3]$   
 (c)  $\frac{d[\text{NO}_3]}{dt} = -K_1 K_2 [\text{NO}_3][\text{NO}]$  (d)  $\frac{d[\text{NO}_3]}{dt} = -K_1 [\text{NO}_2][\text{NO}_3]$

- (x) Which of the following is the best description of the geometry of PCl<sub>5</sub>?  
 (a) Tetrahedral (b) Trigonal Pyramid (c) Trigonal bipyramid (d) Square pyramid.



This reaction could successfully be performed using which one of the following reagents.  
 (a) Ph<sub>3</sub>PCH<sub>2</sub> (b) CH<sub>3</sub>OCOCH<sub>2</sub>COOCH<sub>3</sub> (c) CH<sub>2</sub>Br<sub>2</sub> (d) PCC

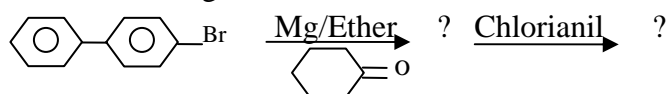
**CHEMISTRY, PAPER-II**

- (xii) Which one of the following is not a petrochemical.
  - (a) Cumene      (b) Paraffin      (c) Aluminum Chloride      (d) Epoxy
- (xiii) The term syndiotactic is related to which one of the following?
  - (a) Synthetic detergents      (b) Table Salt      (c) Paraffin      (d) Polypropylene
- (xiv) Which one of the following is used as an Antibiotic?
  - (a) Patulin      (b) Insulin      (c) Soserine      (d) Trypsin
- (xv) Heroin is diacetate of:
  - (a) Papaverine      (b) Morphine      (c) Codeine      (d) Thebaine
- (xvi) A reaction that practically is given by all organic compounds.
  - (a) Elimination      (b) Friedel-Craft ecylation      (c) Combustion      (d) Rearrangement
- (xvii) Which functional group is present in polyester shirt?
  - (a) Lactam      (b) Acid Chloride      (c) Ether      (d) Ester
- (xviii) Which statement is true for Halogen (Halo-group)?
  - (a) Activating and O, p-directing      (b) Activating and m-directing
  - (c) Deactivating and O, p-directing      (d) None of these.
- (xix) Which one of the following can be synthesized from Aryl Diazonium Salt?
  - (a) Furfural      (b) Carbylamine(c)      Biphenyl      (d) THF
- (xx) The Methyl group in Methyl Magnesium Iodide can act as:
  - (a) CH<sub>3</sub> Radical      (b) CH<sub>3</sub> Carbonium ion      (c) CH<sub>3</sub> Carbanion      (d) Can react with a base

**PART – II**

<b>NOTE:</b>	<p>(i) <b>PART-II</b> is to be attempted on the separate <b>Answer Book</b>.</p> <p>(ii) Attempt <b>ONLY FOUR</b> questions from <b>PART-II</b>. All questions carry <b>EQUAL</b> marks.</p> <p>(iii) Extra attempt of any question or any part of the attempted question will not be considered.</p>
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- Q.2.** (a) Explain the structure of Grignard’s reagent. (6)
- (b) How aldehydes, ketones, carboxylic acids, Hydrocarbons and alcohols can be synthesized from Grignard’s reagent. (10)
- (c) Complete the following reaction. (4)



- Q.3.** (a) How you will synthesize the following starting from benzene. (2+5+3)
  - (i) Acetophenone      (ii) 1,3,5-tribromobenzene      (iii) n-propyl benzene
- (b) In electrophilic aromatic substitution “Halogens” are deactivating but O, p-directing. Explain. (5)
- (c) Sulphonation is reversible reaction at high temperature. Discuss its merits.. (5)
- Q.4.** (a) Describe various methods to determine the order of reaction. (9)
- (b) What is the third order reaction. Give examples. (4)
- (c) Derive the Kinetic equation for 3<sup>rd</sup> order reaction. (7)
- Q.5.** (a) Can we prepare the Aliphatic diazonium salt. If yes, give examples. (3)
- (b) How can the following prepared from benzene diazonium salt. (3+5+4)
  - (i) Benzene      (ii) m-nitrophenol      (iii) Biphenyl
- (c) Write a note on Sandmeyer reaction. (5)
- Q.6.** (a) Describe the exact source of raw material used in Petrochemicals. (3)
- (b) Give Industrial synthesis of vinylacetate. (10)
- (c) Describe the production of Vitamin-C from Glucose. (7)
- Q.7.** (a) Describe the synthesis of streptomycin. (6)
- (b) Discuss the role of Fermentation in Organic Synthesis. (4)
- (c) Give synthesis of polypropylene and its uses. (10)
- Q.8.** (a) What is Margarine? How it is manufactured industrially? (10)
- (b) Nicotine on Oxidation with KMnO<sub>4</sub> gave. Nicotinic acid. Write structures of nicotine, nicotinic acid and two other isomer of nicotinic acid. (6)
- (c) Write a note on epimerization. (4)

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